

CLAIMS

What is claimed is:

1. A computerized cluster-based backup method, comprising:
 - selecting a source partition on a hard disk drive, where a cluster-based backup image of the source partition will be produced and stored in a target partition on the hard disk drive;
 - obtaining a boot record for the source partition;
 - examining the boot record to determine a value for one or more file system parameters for a file system stored in the source partition;
 - calculating one or more values for one or more source partition metadata parameters from the one or more file system parameters and one or more source partition parameters;
 - writing a cluster-based backup image header data structure to the target partition, where the cluster-based backup image header data structure includes one or more of, the source partition metadata parameters, the file system parameters, and the source partition parameters;
 - selectively manipulating one or more bits in a volume bitmap associated with the source partition, where the bits are associated with one or more files that are not to be included in the cluster-based backup image;
 - identifying, by accessing the volume bitmap, one or more clusters in the source partition to be included in the cluster-based backup image; and
 - for the one or more clusters:
 - reading a cluster from the source partition; and
 - writing the cluster to the cluster-based backup image.
2. The method of claim 1, where the cluster-based backup image is created at a rate of more than five hundred megabytes per minute.
3. The method of claim 1, where the target partition is in the source partition.
4. The method of claim 1, where the target partition is not in the source partition.

5. The method of claim 1, where the boot record is obtained by reading the first sector from the source partition.
6. The method of claim 1, where the file system parameters include one or more of, a file system type, a file system size, and a cluster size.
7. The method of claim 1, where the cluster-based backup image header data structure includes one or more of, a header length field, a format version field, an original file name field, a partition cluster count field, a backup image cluster count field, a volume bitmap bit count field, a cluster size field, a sector size field, and a partition type field.
8. The method of claim 1, where the files that are not to be included in the cluster-based backup image include one or more of, a hiberfil.sys file, a pagefile.sys file and a ghost file.
9. The method of claim 1, where the boot record is obtained using a WinPE process.
10. The method of claim 1, where the boot record is examined using a WinPE process.
11. The method of claim 1, where the cluster-based backup image header data structure is written to the target partition using a WinPE process.
12. The method of claim 1, where the volume bitmap is accessed using a WinPE process.
13. The method of claim 1, where the cluster is read from the source partition using a WinPE process.
14. The method of claim 1, where the cluster is written to the cluster-based backup image using a WinPE process.
15. A computer-readable medium storing processor executable instructions operable to perform a method, the method comprising:
 - selecting a source partition on a hard disk drive, where a cluster-based backup image of the source partition will be produced and stored in a target partition on the hard disk drive;

- obtaining a boot record for the source partition using a WinPE process;
- examining the boot record using a WinPE process to determine a value for one or more of, a file system type, a file system size, and a cluster size associated with a file system stored in the source partition;
- calculating one or more values for one or more source partition metadata parameters from one or more source partition parameters and one or more of, the file system type, the file system size, and the cluster size;
- writing a cluster-based backup image header data structure to the target partition using a WinPE process, where the cluster-based backup image header data structure includes one or more of, the source partition metadata parameters, the source partition parameters, the file system type, the file system size, and the cluster size;
- selectively manipulating, using a WinPE process, one or more bits in a volume bitmap associated with the source partition, where the bits are associated with one or more files that are not to be included in the cluster-based backup image;
- identifying, by accessing the volume bitmap, one or more clusters in the source partition to be included in the cluster-based backup image; and
- for the one or more clusters:
 - reading a cluster from the source partition, using a WinPE process; and
 - writing the cluster to the cluster-based backup image, using a WinPE process.

16. A computerized method for producing a cluster-based backup image of a source partition on a hard disk drive, comprising:

- retrieving one or more source partition parameters from a boot data structure associated with the source partition;
- accessing a volume bitmap associated with the source partition to facilitate identifying one or more clusters to be included in the cluster-based backup image; and
- producing the cluster-based backup image by:
 - writing to a target partition a cluster-based backup image metadata data structure configured to store partition metadata; and
 - for one or more clusters in the source partition:
 - selectively reading a cluster based, at least in part, on information stored in the volume bitmap;
 - writing the cluster to the target partition; and

linking the cluster written to the target partition to the cluster-based backup image metadata data structure to facilitate restoring the source partition from the target partition.

17. The method of claim 16, where the source partition parameters include one or more of, a file system type, a file system size, and a cluster size.
18. The method of claim 16, where the boot data structure comprises a boot record.
19. The method of claim 16, where the volume bitmap is accessed using a WinPE process.
20. The method of claim 16, where the target partition is in the source partition.
21. The method of claim 16, where the target partition is not in the source partition.
22. The method of claim 16, where one or more clusters are read from the source partition in order using a WinPE process.
23. The method of claim 16, where one or more clusters are written to the target partition in order using a WinPE process.
24. A computer-readable medium storing processor executable instructions operable to perform a method for producing a cluster-based backup image of a source partition on a hard disk drive, the method comprising:
 - retrieving one or more of, a file system type, a file system size, and a cluster size associated with a file system stored on the source partition from a boot record associated with the source partition;
 - accessing, using a WinPE process, a volume bitmap associated with the source partition to facilitate identifying one or more clusters to be included in the cluster-based backup image; and
 - producing the cluster-based backup image by:

writing, using a WinPE process, to a target partition, a cluster-based backup image metadata data structure configured to store partition metadata; and

for one or more clusters in the source partition:

selectively reading, in order, using a WinPE process, a cluster based, at least in part, on information stored in the volume bitmap;

writing, in order, using a WinPE process, the cluster to the target partition; and

linking the cluster written to the target partition to the cluster-based backup image metadata data structure to facilitate restoring the source partition from the target partition.

25. A computerized partition restoration method, comprising:

identifying a partition to restore on a hard disk drive;

locating one or more cluster-based backup images from which the partition can be restored, where the one or more cluster-based backup images are located on the hard disk drive;

selecting a cluster-based backup image from which the partition will be restored;

reading a cluster-based backup image header data structure from the cluster-based backup image to obtain one or more of, a partition parameter, and a file system parameter;

writing one or more partition parameters to a boot record associated with the partition;

writing one or more file system parameters to the boot record associated with the partition;

resetting one or more bits of a volume bitmap associated with the partition; and

for one or more clusters in the cluster-based backup image:

reading a cluster from the cluster-based backup image;

writing the cluster to the partition; and

updating the volume bitmap to include the written cluster in a set of active clusters in the partition.

26. The method of claim 25, where the cluster-based backup image is located in the same partition as the partition to restore.

27. The method of claim 25, where the cluster-based backup image is located in a different partition than the partition to restore.
28. The method of claim 25, where the file system parameters include one or more of, a file system type, a file system size, and a cluster size.
29. The method of claim 25, where one or more of, reading the cluster-based backup image header data structure, writing the partition parameters to the boot record, writing the file system parameters to the boot record, resetting the bits in the volume bitmap, reading a cluster, and writing a cluster are performed using a WinPE process.
30. The method of claim 25, where the partition to be restored includes one or more of, an NTFS file system, and a FAT32 file system.
31. A computer-readable medium storing processor executable instructions operable to perform a method for restoring a partition from a cluster-based backup image, the method comprising:
- identifying the partition to restore on a hard disk drive, where the partition includes one or more of, an NTFS file system, and a FAT32 file system;
 - locating one or more cluster-based backup images from which the partition can be restored, where the cluster-based backup images are located on the hard disk drive and where the cluster-based backup images are located in one or more of, the same partition as the partition to be restored, and a different partition than the partition to be restored;
 - selecting a cluster-based backup image from which the partition will be restored;
 - reading, using a WinPE process, a cluster-based backup image header data structure from the cluster-based backup image to obtain one or more of, a partition parameter, a file system name, a file system size, a file system type, and a cluster size;
 - writing, using a WinPE process, one or more partition parameters to a boot record associated with the partition;
 - writing, using a WinPE process, one or more of, the file system name, the file system size, the file system type, and the cluster size to the boot record associated with the partition;
 - resetting, using a WinPE process, one or more bits of a volume bitmap associated with the partition to restore; and

for one or more clusters in the cluster-based backup image:

 reading a cluster from the cluster-based backup image, using a WinPE process;

 writing the cluster to the partition to restore, using a WinPE process; and

 updating the volume bitmap to include the written cluster in a set of active clusters in the partition to restore.

32. A computerized method for restoring a partition on a hard disk drive from a cluster-based backup image stored on the hard disk drive, the method comprising:

 clearing a volume bitmap associated with the partition to be restored;

 clearing a partition metadata data structure associated with the partition to be restored;

 reading one or more partition metadata parameter values from the cluster-based backup image;

 writing one or more of the partition metadata parameter values to the partition metadata data structure; and

 for one or more clusters in the cluster-based backup image:

 reading a cluster from the cluster-based backup image;

 writing the cluster to the partition to be restored; and

 updating the volume bitmap to include the cluster written to the partition to be restored as part of the restored partition.

33. The method of claim 32, where the volume bitmap is accessed using a WinPE process.

34. The method of claim 32, where the cluster-based backup image is stored in the same partition as the partition to be restored.

35. The method of claim 32, where the cluster-based backup image is stored in a different partition than the partition to be restored.

36. The method of claim 32, where the cluster-based backup image includes one or more of, an NTFS file system, and a FAT32 file system.

37. A computer-readable medium storing processor executable instructions operable to perform a method for restoring a partition on a hard disk drive from a cluster-based backup image stored on the hard disk drive, the method comprising:

- clearing, using a WinPE process, a volume bitmap associated with the partition to be restored;

- clearing, using a WinPE process, a partition metadata data structure associated with the partition to be restored;

- reading, using a WinPE process one or more of, a partition file system name, a partition file system type, a partition file system size, and a cluster size from the cluster-based backup image;

- writing one or more of, the partition file system name, the partition file system type, the partition file system size, and the cluster size to the partition metadata data structure; and

- for one or more clusters in the cluster-based backup image:

- reading, using a WinPE process, a cluster from the cluster-based backup image;

- writing, using a WinPE process, the cluster to the partition to be restored; and

- updating the volume bitmap to include the cluster written to the partition to be restored as part of the restored partition.

38. A system, comprising:

- a metadata logic configured to acquire a partition metadata that describes a hard disk drive partition to be backed up, and to write the partition metadata to a cluster-based backup image on the hard disk drive from which the hard disk drive partition can be restored; and

- a data logic configured to access a volume bitmap associated with the hard disk drive partition to be backed up, to selectively read a cluster identified in the volume bitmap as being allocated to the hard disk drive partition to be backed up, and to write the cluster to the cluster-based backup image.

39. The system of claim 38, where the metadata logic is further configured to acquire a partition metadata from a cluster-based backup image where the partition metadata describes a hard disk drive partition to be restored, and to write the partition metadata to a data structure on the hard disk drive to which the hard disk drive partition will be restored; and

where the data logic is further configured to access a volume bitmap data associated with the hard disk drive partition to be restored from the cluster-based backup image, to selectively read a cluster from the cluster-based backup image, to write the cluster to the partition to be restored, and to update the volume bitmap to associate the written cluster with the partition to be restored.

40. The system of claim 39, where the cluster-based backup image is located in the same partition as the hard disk drive partition to be backed up.

41. The system of claim 39, where the cluster-based backup image is located in a different partition than the hard disk drive partition to be backed up.

42. The system of claim 39, where the partition metadata is acquired from a boot record associated with the hard disk drive partition to be backed up.

43. A system, comprising:

means for identifying a partition on a hard disk drive for which a cluster-based backup image is to be written onto the hard disk drive;

means for acquiring and writing to the cluster-based backup image a partition metadata that describes the partition on the hard disk drive; and

means for acquiring and writing to the cluster-based backup image a partition data comprising one or more used clusters in the partition on the hard disk drive.

44. A system, comprising:

means for identifying a cluster-based backup image on a hard disk drive from which a partition on the hard disk drive can be restored;

means for acquiring and writing a cluster-based backup image partition metadata to the partition to be restored; and

means for acquiring and writing to the partition to be restored a partition data comprising one or more clusters stored in cluster-based backup image.

45. In a computer system having a graphical user interface comprising a display and a selection device, a method of providing and selecting from a set of data entries on the display, the method comprising:

- retrieving a set of data entries, where a data entry represents one of, a cluster-based image backup action and a cluster-based image restore action;

- displaying the set of data entries on the display;

- receiving a data entry selection signal indicative of the selection device selecting a selected data entry; and

- in response to the data entry selection signal, initiating one of, a cluster-based image backup operation, and a cluster-based image restore operation associated with the selected data entry.

46. A computer-readable medium having stored thereon a data structure comprising:

- a first field containing data representing a cluster-based image from which a partition on a hard disk drive can be restored; and

- a second field containing metadata describing the cluster-based image stored in the first field.

47. A set of application programming interfaces embodied on a computer-readable medium for execution by a computer component in conjunction with performing one or more of, a cluster-based image backup, and a cluster-based image restore, comprising:

- a first interface for identifying a partition on a hard disk drive for which a cluster-based backup image is to be produced and a target partition on the hard disk drive in which the cluster-based backup image is to be written; and

- a second interface for identifying a cluster-based backup image on the hard disk drive from which a partition on the hard disk drive can be restored and a target partition on the hard disk drive to be restored.